

# Reliable Direct Bond Copper Ceramic Packages for High Temperature Power Electronics, Phase I

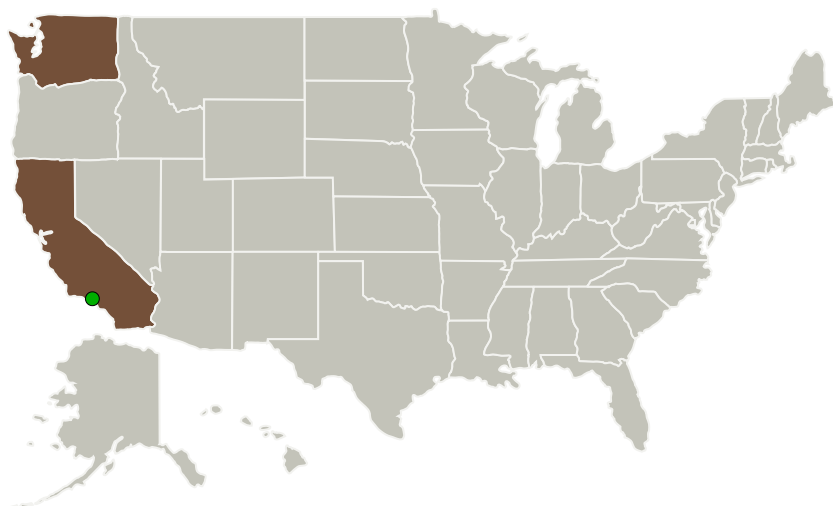
Completed Technology Project (2010 - 2010)



## Project Introduction

The proposed program will develop highly reliable, hermetic, Si<sub>3</sub>N<sub>4</sub> ceramic multichip modules to integrate commercially available SiC power devices to build power electronic modules for reliable operation above 500°C in extreme environments of space exploration. The Phase I program will demonstrate a reliable direct bond copper (DBC) process for Si<sub>3</sub>N<sub>4</sub> substrates, develop high current carrying hermetic feedthroughs, an innovative transient liquid phase (TLP) die attach, and a monometallic wire bonding capable of reliable operation above 500°C; and fabricate and test a hermetic single-chip module.

## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work    | Role                    | Type        | Location                |
|----------------------------------|-------------------------|-------------|-------------------------|
| Sienna Technologies, Inc.        | Lead Organization       | Industry    | Woodinville, Washington |
| ● Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California    |

### Primary U.S. Work Locations

|            |            |
|------------|------------|
| California | Washington |
|------------|------------|



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## Project Transitions



**January 2010:** Project Start



**July 2010:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139397>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Sienna Technologies, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

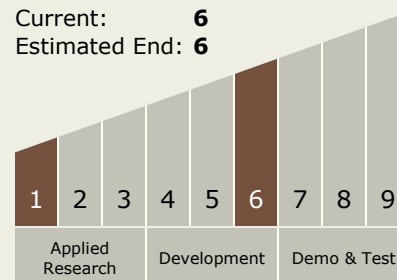
Carlos Torrez

### Principal Investigator:

Ender Savrun

## Technology Maturity (TRL)

Start: **1**  
Current: **6**  
Estimated End: **6**



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.2 Electronics

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System